

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A process of producing a pulp sheet, comprising the steps of adding a paper quality improver for papermaking to pulp in any step before a papermaking step;

[[A]] wherein the paper quality improver for papermaking, comprising a copolymer (A) having a constituent unit derived from at least one nonionic monomer having a solubility parameter of $20.5 \text{ (MPa)}^{1/2}$ or less and a constituent unit derived from at least one anionic or cationic monomer, and a surfactant (B) at an (A)/(B) ratio in the range of 99/1 to 1/99 (weight ratio), the quality improver providing at least one paper quality improving effect of the followings (i), (ii), and (iii):

(i) standard improved bulky value: 0.02 g/cm^3 or more;

(ii) standard improved opacity: 1.0 point or more; and

(iii) standard improved brightness: 0.5 point or more;

wherein the copolymer (A) further comprises a constituent unit derived from at least one nonionic unsaturated monomer having a solubility parameter of $26.6 \text{ (MPa)}^{1/2}$ or more; and

wherein, as the contents of the constituent monomers, the copolymer (A) comprises:

5 to 84% by weight of the nonionic monomer having a solubility parameter of $20.5 \text{ (MPa)}^{1/2}$ or less,

1 to 80% by weight in total of the anionic monomer and the cationic monomer, and

15 to 94% by weight of the nonionic unsaturated monomer having a solubility parameter of $26.6 \text{ (MPa)}^{1/2}$ or more;

Reply to Non-Final Office Action of July 23, 2007

wherein the surfactant (B) is a water-soluble alcohol alkylene oxide adduct containing an alkylene oxide group having 2 to 4 carbons in an average amount of 5 to less than 150 moles per 1 mole of the alcohol; ~~[[and]]~~

wherein the paper quality improver provides a paper quality improver effect of a standard improved ratio in burst index of ~~—502 or more; and~~

wherein the paper quality improver is added anywhere before the papermaking step when a paper layer is formed while water in a dilute solution of a pulp material is filtered through a wire while moving thereon.

2. (Currently Amended) A process of producing a pulp sheet, comprising the steps of adding a paper quality improver for papermaking to pulp in any step before a papermaking step;

~~[[A]]~~ wherein the paper quality improver for papermaking, comprising a copolymer (A) having a constituent unit derived from at least one nonionic unsaturated monomer having a solubility parameter of $20.5 \text{ (MPa)}^{1/2}$ or less and a constituent unit derived from at least one anionic or cationic monomer, and a surfactant (B) at a rate in the range of (A)/(B) of 99/1 to 1/99 (weight ratio), the quality improver providing at least one paper quality improving effect of the followings (i), (ii), and (iii):

(i) standard improved bulky value: 0.02 g/cm^3 or more;

(ii) standard improved opacity: 1.0 point or more; and

(iii) standard improved brightness: 0.5 point or more;

wherein the copolymer (A) further comprises a constituent unit derived from at least one nonionic unsaturated monomer having a solubility parameter of $26.6 \text{ (MPa)}^{1/2}$ or more; and

Reply to Non-Final Office Action of July 23, 2007

wherein, as the contents of the constituent monomers, the copolymer (A) comprises:

5 to 84% by weight of the nonionic unsaturated monomer having a solubility parameter of $20.5 \text{ (MPa)}^{1/2}$ or less;

1 to 80% by weight in total of the anionic monomer and the cationic monomer, and

15 to 94% by weight of the nonionic unsaturated monomer having a solubility parameter of $26.6 \text{ (MPa)}^{1/2}$ or more;

wherein the surfactant (B) is a water-soluble alcohol alkylene oxide adduct containing an alkylene oxide group having 2 to 4 carbons in an average amount of 5 to less than 150 moles per 1 mole of the alcohol; [[and]]

wherein the paper quality improver provides a paper quality improver effect of a standard improved ratio in burst index of -502 or more; and

wherein the paper quality improver is added anywhere before the papermaking step when a paper layer is formed while water in a dilute solution of a pulp material is filtered through a wire while moving thereon.

3-5. (Cancelled)

6. (Currently Amended) A process of producing a pulp sheet ~~The paper quality improver for papermaking~~ according to claim 1, wherein one of the constituent monomers of copolymer (A) further comprises a crosslinkable constituent monomer.

Reply to Non-Final Office Action of July 23, 2007

7. (Currently Amended) A process of producing a pulp sheet ~~The paper quality improver for papermaking~~ according to claim 1, wherein the HLB of the surfactant (B) is in the range of -5 to 15.

8-10. (Canceled)

11. (Currently Amended) A process of producing a pulp sheet ~~The paper quality improver for papermaking~~ according to claim 1, further comprising a water-soluble polymer (C) having at least one of a weight-average molecular weight of 1000 to 10,000,000 and a viscosity at 25°C in an 1% aqueous solution of 1 to 4,000 mPa·s.

12. (Currently Amended) A process of producing a pulp sheet ~~The paper quality improver for papermaking~~ according to claim 1, exerting the effect of a standard improved ratio in burst index of -3,000 or more.

13. (Currently Amended) A process of producing a pulp sheet ~~[[,]] comprising the steps of adding the paper quality improver for papermaking according to claim 1 to pulp in any step before a papermaking step and papermaking the pulp at a papermaking speed of 200 m/min or more.~~

Reply to Non-Final Office Action of July 23, 2007

14. (Currently Amended) A pulp sheet ~~comprising the paper quality improver for papermaking according to claim 1~~ which is obtained by adding a paper quality improver for papermaking to pulp in any step before a papermaking step;

wherein the paper quality improver for papermaking, comprising a copolymer (A) having a constituent unit derived from at least one nonionic monomer having a solubility parameter of $20.5 \text{ (MPa)}^{1/2}$ or less and a constituent unit derived from at least one anionic or cationic monomer and a surfactant (B) at an (A)/(B) ratio in the range of 99/1 to 1/99 (weight ratio), the quality improver providing at least one paper quality improving effect of the followings (i), (ii), and (iii):

(i) standard improved bulky value: 0.02 g/cm^3 or more;

(ii) standard improved opacity: 1.0 point or more; and

(iii) standard improved brightness: 0.5 point or more;

wherein the copolymer (A) further comprises a constituent unit derived from at least one nonionic unsaturated monomer having a solubility parameter of $26.6 \text{ (MPa)}^{1/2}$ or more; and

wherein, as the contents of the constituent monomers, the copolymer (A) comprises:

5 to 84% by weight of the nonionic monomer having a solubility parameter of $20.5 \text{ (MPa)}^{1/2}$ or less,

1 to 80% by weight in total of the anionic monomer and the cationic monomer, and

15 to 94% by weight of the nonionic unsaturated monomer having a solubility parameter of $26.6 \text{ (MPa)}^{1/2}$ or more;

Reply to Non-Final Office Action of July 23, 2007

wherein the surfactant(B) is a water-soluble alcohol alkylene oxide adduct containing an alkylene oxide group having 2 to 4 carbons in an average amount of 5 to less than 150 moles per 1 mole of the alcohol;

wherein the paper quality improver provides a paper quality improver effect of a standard improved ratio in burst index of -502 or more; and

Wherein the paper quality improver is added anywhere before the papermaking step when a paper layer is formed while water in a dilute solution of a pulp material is filtered through a wire while moving thereon.

15. (Cancelled)

16. (Currently Amended) A process of producing a pulp sheet ~~The paper quality improver for papermaking~~ according to claim 1, wherein the content of the nonionic monomer having a solubility parameter of 20.5 or less in the monomer composition of the copolymer (A), is 15 to 60% by weight.

17. (Currently Amended) A process of producing a pulp sheet ~~The paper quality improver for papermaking~~ according to claim 1, wherein the content of the nonionic monomer having a solubility parameter of 20.5 or less in the monomer composition of the copolymer (A), is 20 to 50% by weight.

Reply to Non-Final Office Action of July 23, 2007

18. (Currently Amended) A process of producing a pulp sheet ~~The paper quality improver for papermaking~~ according to claim 1, wherein the weight ratio (A)/(B) of the copolymer (A) to the surfactant (B) is 85/15 to 15/85.

19. (Currently Amended) A process of producing a pulp sheet ~~The paper quality improver for papermaking~~ according to claim 1, wherein the weight ratio of the copolymer (A) and surfactant (B) to the water-soluble polymer (C), which is [copolymer (A) + surfactant (B)]/[water-soluble polymer (C)], is 98/2 to 20/80.

20. (Currently Amended) A process of producing a pulp sheet ~~The paper quality improver for papermaking~~ according to claim 1, wherein the copolymer (A) has a weight-average molecular weight of 10,000 to 2,000,000, as determined when using polyethylene glycol as a standard sample in GPC (gel permeation chromatography).

21. (Cancelled)

22. (Currently Amended) A process of producing a pulp sheet ~~The paper quality improver for papermaking~~ according to claim 1, wherein the mixture of the copolymer (A) and the surfactant (B) is water-soluble.

Reply to Non-Final Office Action of July 23, 2007

23. (Currently Amended) A process of producing a pulp sheet ~~The paper quality improver for papermaking~~ according to claim 1, wherein said at least one nonionic unsaturated monomer having a solubility parameter of $26.6 \text{ (MPa)}^{1/2}$ or more is acrylamide.

24. (Currently Amended) A process of producing a pulp sheet ~~The paper quality improver for papermaking~~ according to claim 1, wherein said nonionic monomer having a solubility parameter of $20.5 \text{ (MPa)}^{1/2}$ or less is a monomer selected from the group consisting of alkyl (meth) acrylic acid of 1 to 40 carbons, vinyl alcohol of 1 to 40 carbons, alkyl-modified (meth) acrylamides of 2 to 40 carbons, alkoxy-modified (meth) acrylamides of 2 to 40 carbons, mono-alkyl esters of maleic acid of 1 to 40 carbons, di-alkyl esters of maleic acid of 1 to 40 carbons, mono-alkyl esters of fumaric acid of 1 to 40 carbons; di-alkyl esters of fumaric acid of 1 to 40 carbons, styrene, vinyltoluene, α -methylstyrene, ethylene, propylene, butadiene, polyalkylene glycol (meth) acrylates, alkoxy polyalkylene glycol (meth) acrylates, polyalkylene glycol alkenylethers and alkoxy polyalkylene glycol alkenylethers.

26. (NEW) A process of producing a pulp sheet according to claim 1, wherein the copolymer (A) and the surfactant (B) are added separately.

27. (NEW) A process of producing a pulp sheet according to claim 1, wherein the surfactant (B) is added to an aqueous solution of copolymer (A).